

WHAT IS CLAIMED:

- ~~1.~~ A scanning optical microscope of the type which includes a single mode optical fiber having one end which serves as point source of light, a lens for focusing light from the end of the fiber onto a point on a focal plane, and for gathering light reflected from said point and focusing said light onto the end of the optical fiber, characterized in that it includes:
- a micromachined scanning mirror means comprising a silicon member,
silicon nitride hinges for supporting said mirror means for rotation about said
hinges,
- a reflective surface carried by said silicon member to receive the light from the
fiber, and
- means for electrostatically activating the mirror means to scan the light along a
first direction and a second orthogonal direction whereby the point on the focal plane is
scanned in said first and second directions and light is directed back from the focal
plane to the end of the optical fiber via the lens and scanning mirror.
- ~~2.~~ A scanning confocal microscope as in Claim 1 in which mirror means comprises
a first micromachined scanning mirror to receive light from the optical fiber and scan
the light along a first direction and a second micromachine scanning mirror to receive
light from the first mirror and scan the light in an orthogonal direction.
- ~~3.~~ A scanning optical microscope as in Claim 1 in which the mirror means
comprises a frame which is supported by nitride hinges for rotation about a first axis,
and a micromachined mirror supported from said frame by nitride hinges for rotation
about an orthogonal axis and whereby said mirror scans the light at first and second
orthogonal directions.
- ~~4.~~ A scanning optical microscope as in Claim 1 in which the end of said optical
fiber is inclined, a beamsplitter is disposed on the end of the optical fiber to reflect the

light received from said focal point onto a detector disposed adjacent to the end of the fiber.

5. A scanning optical microscope as in Claim 1 in which the lens is an off-axis binary lens.

6. A scanning optical microscope as in Claim 1 in which the lens is a refractive lens.

7. A scanning optical microscope as in Claim 1 in which a lens is carried by the silicon member.

8. A scanning optical microscope including:
a low resistivity substrate,
a low resistivity frame hingeably supported above said substrate for rotation about a first axis,
a high resistivity member hingeably supported above said substrate by said frame for rotation about a second orthogonal axis,
a pair of spaced conductive, reflective films carried on the surface of said high resistivity member whereby by selective application of voltage between said conductive films and said substrate, said member is electrostatically rotated about said first axis,
a pair of spaced conductive films carried on the surface of said frame whereby selective application of voltage between said conductive film and said substrate the frame is rotated about the second orthogonal axis, and
a lens for receiving the light scanned by said mirror and focusing it on an image plane for receiving light reflected from said plane and directing it back onto the mirror and optical fiber.

9. A scanning optical microscope as in Claim 8 in which the end of said optical fiber is inclined, a beamsplitter is disposed on the end of the optical fiber to reflect the

light received from said focal point onto a detector disposed adjacent to the end of the fiber.

10. A scanning optical microscope as in Claim 8 in which the lens is an off-axis binary lens.

11. A scanning optical microscope as in Claim 8 in which the lens is a refractive lens.

12. A scanning optical microscope as in Claim 8 in which a lens is carried by the silicon member.

13. A scanning optical microscope as in Claim 8 in which said substrate and said member are silicon.

14. A scanning optical microscope as in Claim 13 in which said means for hingeably supporting said frame and member are silicon nitride.

15. A scanning optical microscope of the type which includes a single mode optical fiber having one end which serves as point source of light, a lens for focusing light from the end of the fiber onto a point on a focal plane, and for gathering light reflected from said point and focusing said light onto the end of the optical fiber, characterized in that it includes:

a micromachined scanning mirror comprising a first high resistivity silicon member as formed in a silicon plate,

a silicon nitride layer including silicon nitride hinges for supporting said mirror from said plate for rotation about a first axis,

a low resistivity substrate disposed adjacent to said mirror, and

spaced reflective conductive surfaces carried by the silicon member to receive the light from the fiber, said spaced reflective conductive surfaces and said substrate

providing means for rotating the mirror responsive to voltages applied between said conductive surfaces and the substrate.

16. A scanning confocal microscope as in Claim 15 in which a second mirror comprising a second high resistivity silicon member formed in said silicon plate, a silicon nitride layer including silicon nitride hinges for supporting said mirror from said plate for rotation about a second orthogonal axis, spaced reflective surfaces carried by the second high conductive resistivity member to receive light from the fiber, said spaced reflective conductive surfaces and said substrate providing means for electrostatically rotating the second mirror responsive to voltages applied between the conductive surfaces and the substrate whereby the combination of mirrors deflects the light in a first and second orthogonal direction.

17. A scanning optical microscope as in Claim 1 in which a silicon frame is formed in said silicon plate, silicon nitride hinges support said frame on said plate for rotation about an orthogonal axis, spaced conductive surfaces carried by said frame, spaced conductive surfaces and said substrate providing means for rotating the frame responsive to voltages applied between said conductive surfaces and the.

18. A scanning optical microscope as in Claim 8 including a *p-n* diode formed between spaced conductive surface carried by the high resistivity member and the high resistivity frame.

19. A scanning mirror comprising:
a semiconductor plate,
a thin film hinge for rotatably supporting said plate,
at least tow conductive electrodes carried by one surface of said semiconductor plate,
a *p-n* junction formed between said conductive electrodes and said plate, and

a conductive member spaced from the other surface of said plate whereby when a voltage is applied between the conductive electrodes and the conductive member, the region below the electrodes is depleted of free carriers and a torsional force is generated which causes the plate to rotate about its support hinge.

